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(56) Documents Cited by ISA
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US 2248701 A

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(54) Abstract Title

Connection for pipeline systems, especially a self-closing quick disconnect coupling with a safety device

(57) The invention relates to a connection for pipeline systems comprised of a so-called gas plug receptacle which has an integrated check valve, and a coupling part to be inserted in the same, and which is connected to a pipe or tubing line, and secured by a bayonet ring (32). In addition, the plug receptacle is equipped with a pin (23) which is concentrically arranged on the coupling part. Said pin opens when the check valve which is integrated in the gas plug receptacle is coupled, whereby the check valve and/or the insert part (22) which accommodates the same is made of a material which softens or melts at high surrounding temperatures and the coupling part is arranged through a gripping piece which is connected to the bayonet ring and which simultaneously serves as an antikink device. A display element for determining the switching state of the connection is arranged on the housing of the gas plug receptacle as well as on the gripping part.

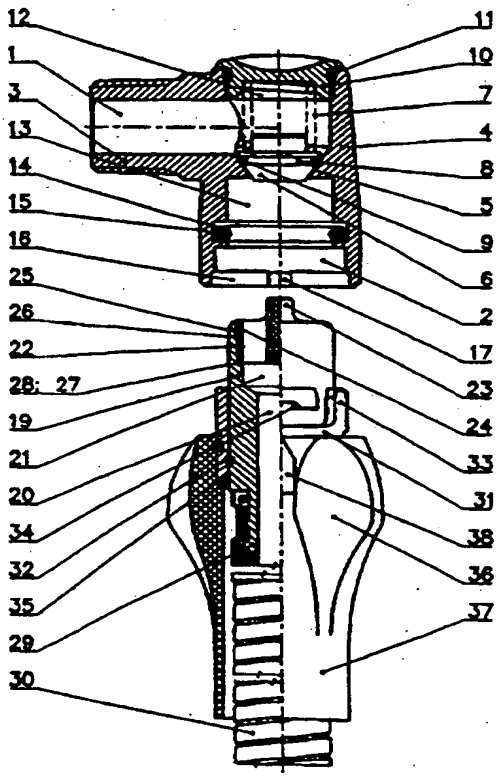

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Fig. 1

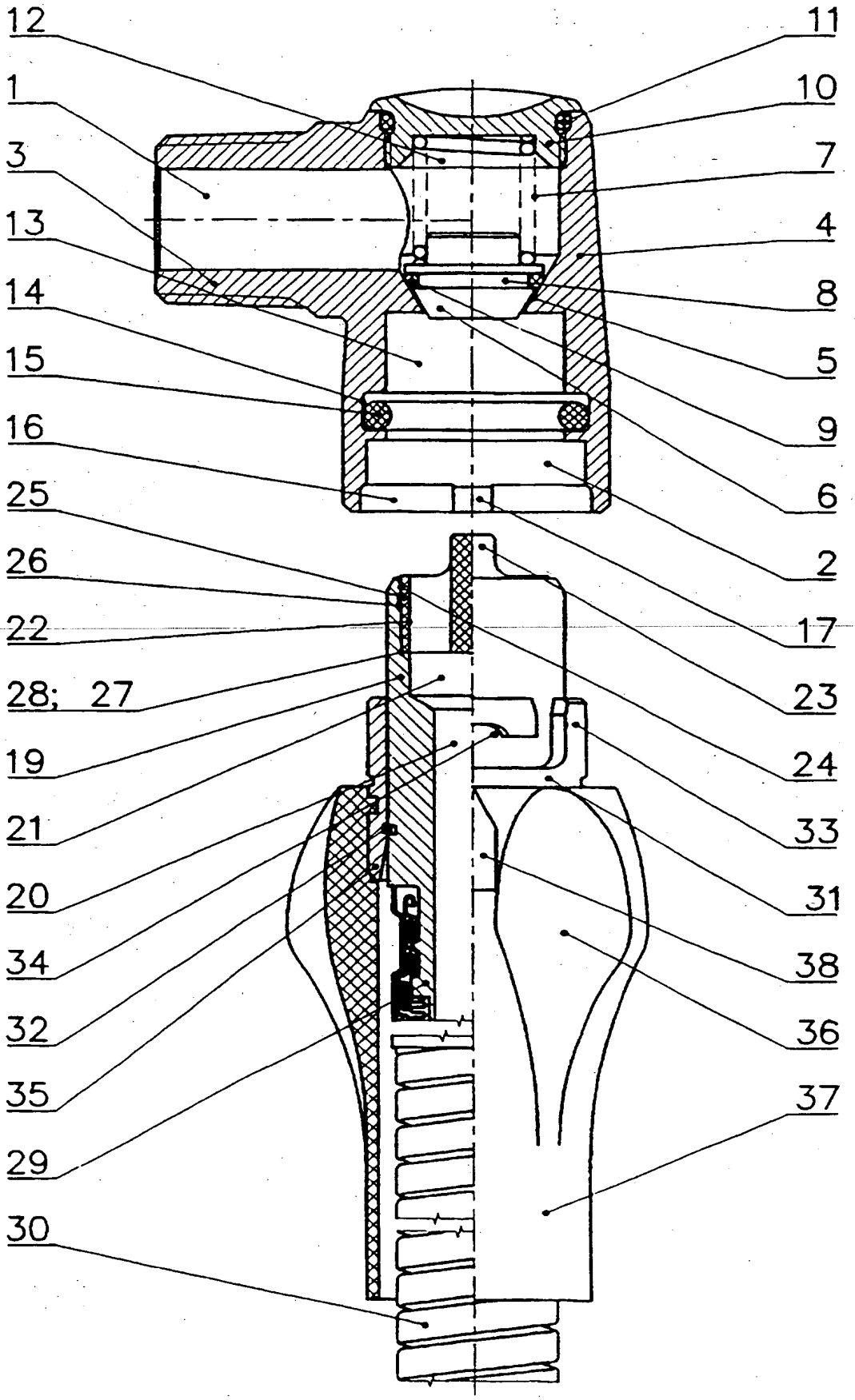


Fig. 2

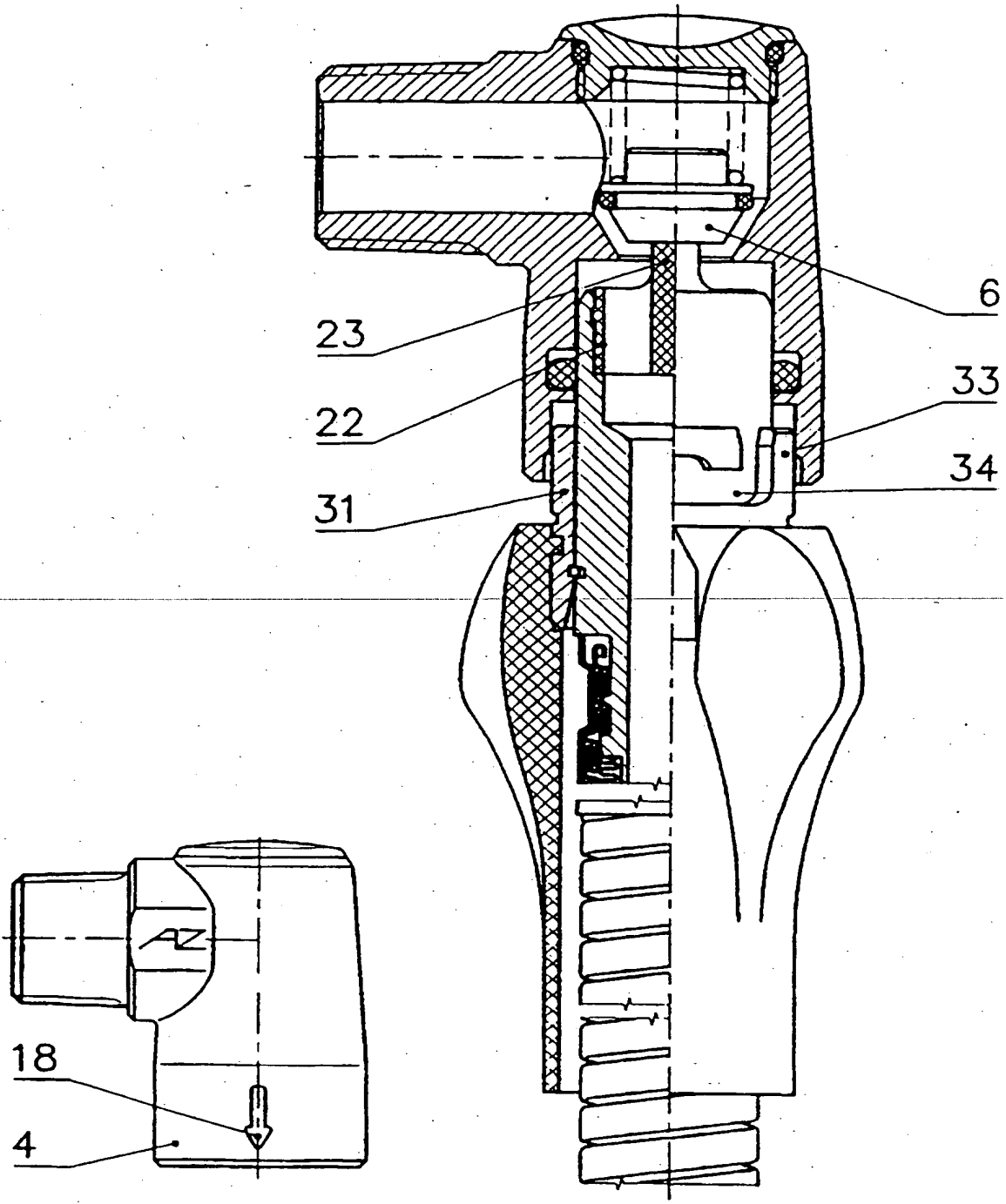
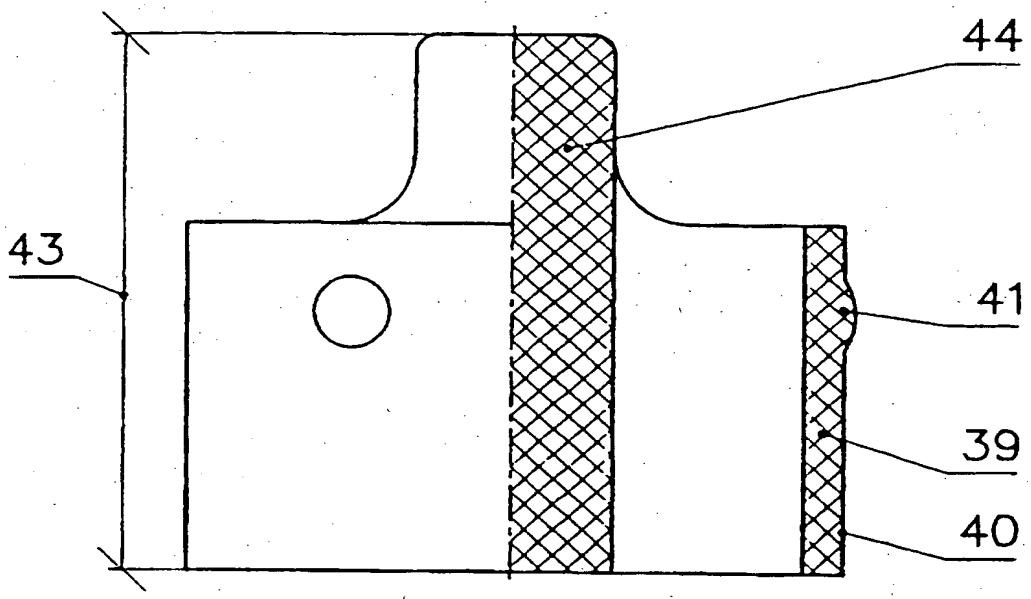


Fig. 3



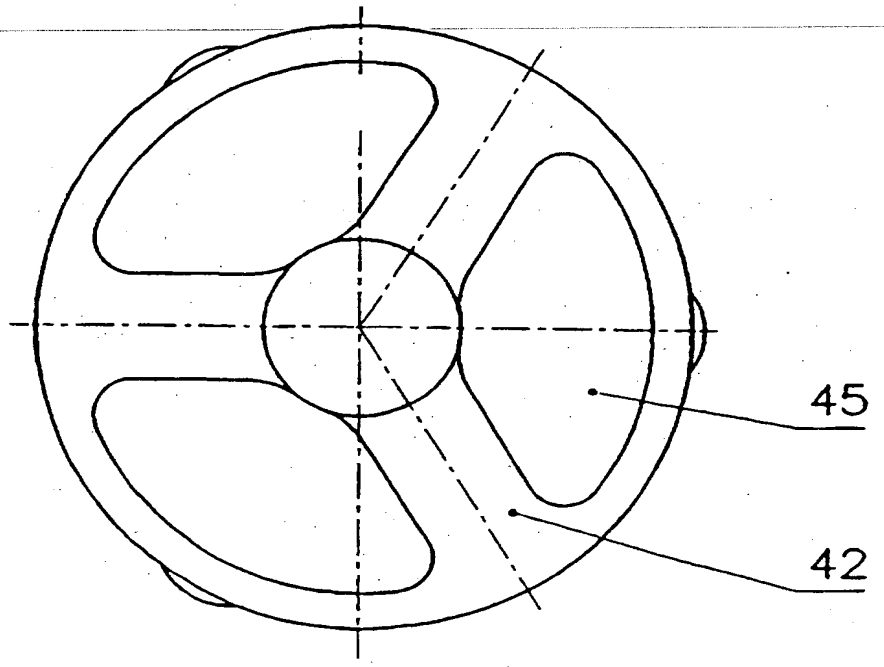
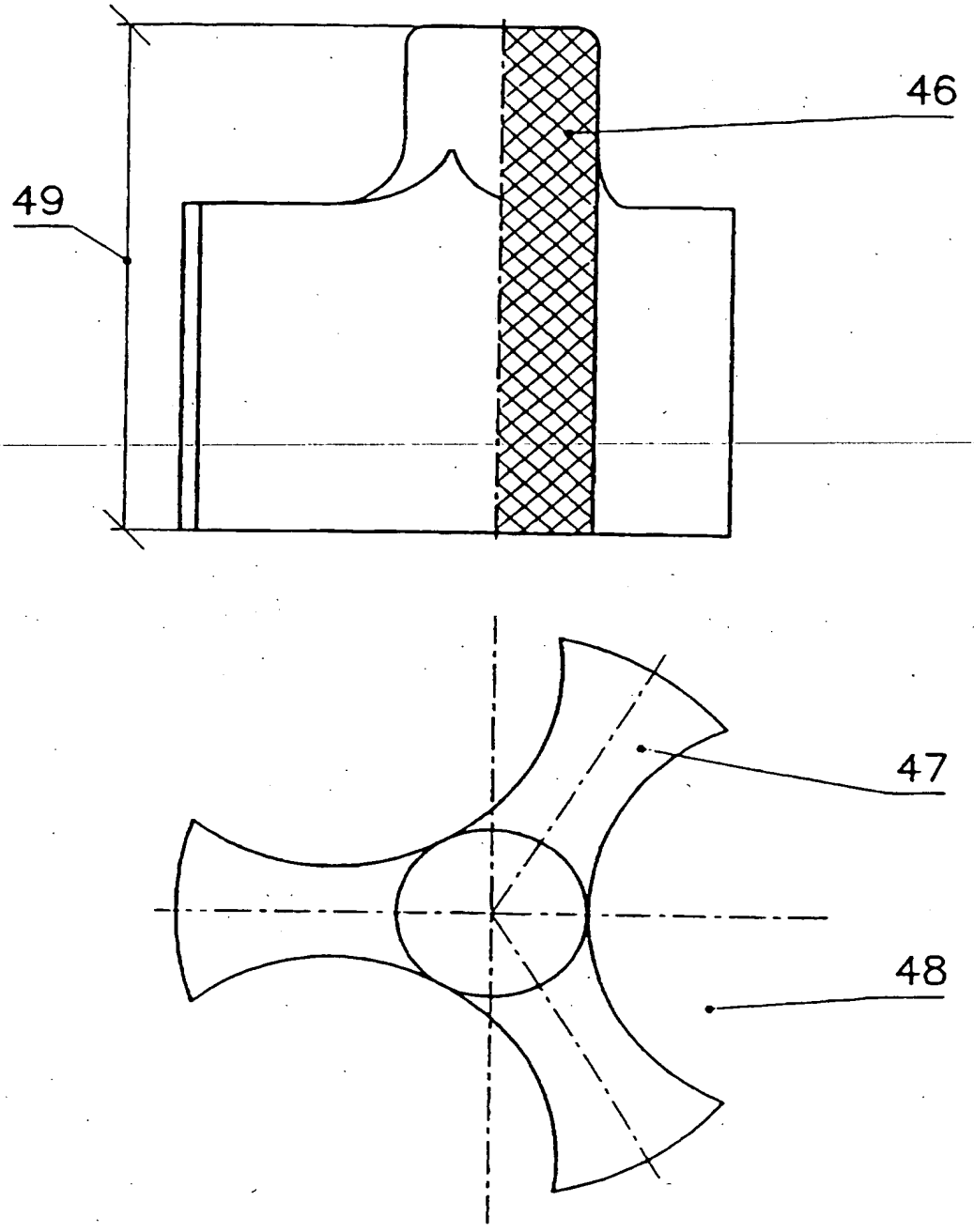


Fig. 4



Title of Invention

Connection for piping systems, particularly rapid-release coupling with safety device.

Sphere of application of invention

The invention is used in the production of pipe connections in piping systems.

The invention is used in particular in gas supply piping systems particularly in piping systems for the distribution and provision of combustion gases, mainly for domestic purposes.

The invention is mainly applied for the connection of mobile consuming apparatus, not installed at a fixed point, to the piping system, with the advantageous additional use of a flexible portion of this latter.

Characteristics of the prior art

The use of a flexible hose for connecting transportable consuming apparatus not permanently installed to gas supply networks is generally known. Systems are likewise known in which it is connected to the fixed piping network by means of a similarly known screw connection. This method of connection necessitates the addition of a shut-off valve, to be built into the fixed gas supply system. This method of construction is expensive, involving a considerable amount of material and a high outlay, besides which it fails to meet present technical, safety and aesthetic standards.

A further generally known method resides in the use of so-called gas sockets consisting of a combination of a ball cock and a hose coupling. When the hose coupling part is inserted into the gas socket installed in a fixed position

the end of the hose is first of all locked in position, sealed off from the gas socket and only then opened by rotating the integrated ball socket, the relevant portion of the piping thus being released. In addition, information is provided on the prevailing control position on the basis of external characteristics. This constructional version of the gas socket, customary in certain countries in Western Europe, is nevertheless not universally applicable, its use in some of them being precluded by standards and acceptance conditions in force.

Gas sockets are also known to be constructed according to British Standard BS 669, Pt. 1, 1989, Sect. 3. The connection to be designed according to this Standard consists of a gas socket in the form of a bend with a built-in non-return valve which is closed when the connection is in its initial state and thus prevents gas from escaping. When the hose is connected up the hose coupling part is inserted into a boring which satisfies the aforementioned standard. On the insertion of the hose coupling part it opens the non-return valve present in the gas socket by means of a pin and releases the relevant section of the piping. The connection is then locked in position by means of a bayonet ring mounted on the hose coupling.

A major drawback of this connection is the absence of any indication of its state. It is thus possible for the hose coupling to be inserted in the gas socket, the non-return valve therein to be opened and the hose coupling to be left without being locked in position. Even if it is assumed that the spring of the non-return valve at some moment pushes the house coupling part back again, closing the non-return valve at the same time, an unverifiable quantity of gas may nevertheless find its way into the consuming appliance before that moment

arrives and may also escape into the open air. A further disadvantage of this connection resides in the fact that all the parts are designed without any measures to provide for damage. There is thus a risk that an outbreak of fire will render the sealing elements inoperative, connection allowing combustion gases to escape without any possibility of control. The combustion gases may cause the existing seat of the fire to spread, and/or leading to the additional risk of explosion.

A further drawback resides in the standardised design of the bayonet ring, of which this prescribed construction makes it difficult to handle and which is unsuitable for the design of this connection, both as regards the cost of manufacture and from the aesthetic point of view. Since at the production stage the hose coupling part first has to be inserted into the gas socket the bayonet ring has to be subjected to an axial force. The bayonet ring then has to be rotated to the side, to enable the bayonet to engage, the axial force being maintained at the same time. The bayonet ring used cannot stand up to these combined demands. It is therefore by no means impossible that during the assembly of the connection axial as lateral forces will at times act on the hose, which will then suffer undesirable deformation.

A considerable additional drawback of the connection according to BS 668 Pt. 1, 1989, Sect. 3, is due to the fact that it calls for the provision of a coaxially positioned pin which opens the non-return valve. In all hitherto known hose connections, therefore, the plug nipple can only be made of metal materials. This method of construction, it its turn necessitates two borings made in opposite directions, one being laterally offset. A plug nipple thus designed is

expensive to produce, since it has to pass through a number of different stages in the manufacturing process and be re-clamped several times at considerable expense. In addition, the bayonet ring likewise has to be made of metallic materials. The production process is therefore at variance with present-day methods and cost-intensive, leading altogether to a result which cannot satisfy modern technological and safety requirements.

Purpose of the invention

The purpose of the invention is to propose a connection consisting of a gas socket according to British Standard BS 669, Pt. 1, 1989, Sect. 3 with an integrated non-return valve and a hose connection with a concentrically positioned pin serving to unlock the non-return valve of the gas socket, the connection being easy and simple to manufacture and at the same time capable of being operated far more satisfactorily than the hose coupling standardised according to BS 669, Pt. 1, Sect. 3. A further object of the invention is to propose a safety device which will ensure the closure of the channel for the medium if the connection is subjected to excess heat.

It is also the purpose of the invention to propose a connection combining all the aforementioned characteristics of the invention and also remaining free of the drawbacks of the state of the art as described.

A further purpose is to propose a connection which will be in accordance with British Standard BS 669, Pt. 1, 1989, Sect. 3, will provide greater safety against thermal overloading thereof and will also be free of the drawbacks of the prior art disclosed.

Characteristics of the Invention

According to the invention the fixed piping system is sealed off by means of a gas socket designed in accordance with British Standard BS 669 , Pt. 1, 1989, Sect. 3 or a similar construction. To this socket is connected a hose coupling likewise designed in accordance with the said Standard or analogously thereto. This coupling consists of an inner bushing firmly connected to the end of the pipe, of a part which is inserted in the said bushing and which at the same time bears the coaxially positioned pin, of a bayonet ring rotatably mounted thereon and of a gripping piece connected with the said ring.

The gas socket mainly consists of a housing which, at the end nearer to the pipe, is provided, according to requirements, with a screw socket or with a threaded stem, and with a non-return valve which is inserted into the channel for the medium and which only gives passage through this latter when its closure device, through forces acting from outside, has caused the sealing element to detach itself from the sealing seating. This removal of the sealing element is effected regularly by the action of connecting up the hose coupling by the aid of the concentric pin provided therein.

In accordance with the Standard, the sealing element of the non-return valve takes the form of a truncated cone, exercises its sealing action against a conical boring, has an additional soft seal, is spring-biased in operation and has a flat surface on the connection side.

Preferably but not necessarily the gas socket is of angular construction. In a suitable position on the housing of the gas socket a masking is provided which serves to indicate the switching position of the connection.

Both the coupling described under the prior art and the coupling according to the invention and to be described hereinafter can be connected to the gas socket thus designed.

In a coupling according to the invention the visible zone of the operating part connected to the bayonet ring is provided with a marking which is capable, in conjunction with the marking on the housing of the gas socket, of determining the switching state of the connection.

In a further version of the coupling a connecting piece is used which is supplemented by an insert part forming its head. The insert is so designed that it is firmly secured in a boring of the connection part, is capable of reliably overcoming the closure force of the spring of the non-return valve present in the gas socket and at the same time only causes minimum reduction of the cross section of the pipe. The insert rests on an edge of the stepped boring of the coupling and is also prevented, by the provision of suitable elements, from accidentally falling out of the boring. This result is advantageously obtained by means of raised parts which engage a recess of the boring of the coupling and are secured therein on the positive interlock principle. Before the "undercut" takes effect the insert has to be pressed, with considerable force, into the stepped boring. If it is subsequently removed or suffers any other damage the connection can no longer be effectively produced, since in this case the non-return valve integrated into the gas socket can no longer open.

The bayonet ring mounted over the connection part is secured on the outer surface thereof in the axial direction by means of a securing device while at the same time remaining rotatable thereon. An advantageous version of the

securing part may consist of a spring ring or wire clamp. It is nevertheless possible to adopt a different type of securing device, particularly a mounting of the positive interlock type, capable of transmitting the axial forces occurring in the course of the connection and disconnection of the coupling.

The bayonet ring is connected with a gripping piece of the same material. The latter serves to operate the bayonet ring.

In a further version of the invention the bayonet ring bears a gripping piece which serves to actuate it and which at the same time has an indicator device which, in conjunction with an indicator element present on the housing of the gas socket, indicates the switching state of the connection.

In a further version a gripping piece is used taking the form of a plastic part and advantageously shaped from the ergonomic point of view.

In a further embodiment a gripping piece has an elongated sleeve-shaped shaft which can be used with particular advantage if the coupling continues in the form of a flexible hose. The bushing enabling the connecting point to be covered and also enabling it to be protected from excessive strain from bending or kinking. It is nevertheless inessential to the invention whether the coupling part is connected with a rigid pipe or with a flexible hose. It is also inessential to the invention how the connection is obtained between the coupling and the pipe extending from the latter.

The insert provided coaxially in the coupling is preferably a component which is made in one piece and which has at least one boring outside the zone of the concentrically positioned operating pin. In view of the technical requirements arising an advantageous version of this part may be produced by a

non-cutting shaping process. It is of particular advantage to make the insert from a thermoplastic material, which can be done by the injection moulding process.

The insert rests by its rear part against an edge provided in the connection part. By means of suitable elements providing an "undercut" it is also prevented from sliding out of the stepped boring. In further advantageous versions of a securing system of this kind it is possible, for instance, to provide raised portions on the periphery of the insert or to employ spring rings or wire rings or to introduce the insert by the "crimping" process or with the use of an adhesive. It is also possible to introduce a thread-like profile or a threading in conjunction with a part which can be screwed in and later removed without difficulty.

In a particularly advantageous version of the insert use is made of a plastic part in one single piece which is simply inserted into an existing boring of the hose connection piece where it is clamped in position on the positive interlock principle, by means of projections shaped onto it and of the same material, in corresponding grooves of the said hose connection piece. This version of the insert ensures that when subjected to increased temperatures its material will soften, undergoes deformation from the effect of external forces and can finally melt away altogether. As the external forces are applied by the closure spring of the non-return valve present in the gas socket, the said non-return valve then closes at the same time and interrupts the supply of gas. The use of a plastic insert thus not only ensures the general efficiency of the connection but also provides increased thermal protection. In the case of a fire, for example, the

supply of gas is interrupted after increased temperatures have only acted for a short time, and even if the sealing effect of the sealing elements provided in the gas socket is nullified, at least a durable metal sealing is ensured.

In a further particularly advantageous version of the connection use is made of a gripping piece likewise made of plastic, its material having a comparatively low softening or melting point. When increased temperatures take effect the gripping piece first of all undergoes softening and deformation, and with a further increase in temperatures it can lose its contact with the bayonet ring and detach itself therefrom. This version is supplemented by an optical signalling system indicating any exposure of the connection to the effect of increased temperatures. A particular reason why this version is of advantage is that the loss of efficiency in the event of increased temperatures is otherwise not signalled, necessitating an onerous search for faults in order to locate the faulty operation of the system. Even one such search involves an appreciable risk, as considerable quantities of gas may escape.

In a further advantageous version the gripping piece may be provided with elements which emit a signal as soon as the connection has been subjected to excess temperatures. This involves additionally mounted indicator elements which change colour when a certain threshold temperature is exceeded or may equally well involve an additional material with analogous properties, filled into the thermoplastic material of the gripping piece. The indicator elements can also be mounted on the housing of the gas socket.

An additional advantageous form of gripping piece is connected to an indicator element arranged in such a manner that when correctly connected it is

situated exactly opposite a further indicator element on the housing of the gas socket. This counteracts any installation faults occurring, inasmuch as a signal is given of the actual control state, particularly of the position of the bayonet ring and the mere fact that the hose connection has been attached is easily evident without the bayonet ring having engaged.

Examples

The invention will be described hereinafter by reference to 4 examples for its performance, these being illustrated in Figs. 1 - 4.

Ex. 1

In this example, shown in Figs. 1 and 2, the connection for piping systems for the transport of gaseous media is described in the form of a hose connection.

A gas socket with a horizontally directed inlet boring (1) and a vertically situated outlet boring (2) is connected by means of a threaded connection piece (3) to the fixed part of a piping system. The outlet boring is made in accordance with the requirements of British Standard BS 669, Pt. 1, 1989, Sect. 3. A dimensionally different design is nevertheless likewise possible. The housing (4) of the gas socket is bent at an angle. A valve seating (5) is worked into the zone where the two borings meet and is made tight by the sealing body (6) of a non-return valve biased by a spring (7). The sealing body (6) accommodates a sealing element (9) in a groove (8). This assembly is closed at the top by a sealing plug (10) and a sealing element (11). The inside of the sealing plug (10) is provided with a boring (12) designed to accommodate and guide the spring (7) of the non-return valve.

The boring (2) on the outlet side takes the form of a stepped cylindrical boring having a groove (14) in the zone of its minimum diameter (13) to enable it to accommodate a sealing element (15). In the zone of the maximum diameter of the boring (16) it has two projecting noses (17). In addition, an indicator element (18) is mounted on the housing (4) of the gas socket.

The non-return valve of the gas socket is so designed that its sealing body (6) reliably closes and seals the outlet boring (2).

To this extent the non-return valve also performs the barrier function of the gas socket.

The hose coupling piece to be connected into the gas socket consists of a plug nipple (19) with a through-boring (20) of which the upper part (21) is widened. It is so dimensioned that it can be inserted in the boring (2) of the gas socket. The boring (21) of the plug nipple (19) contains an insert (22) provided coaxially with a pin-type prolongation (23). The insert (22) is provided on its periphery (24) with notches (25) which in the case of this assembly ensure a firm seating in a groove (26) of the plug nipple (19). The insert (22) rests by its rear edge (27) against an edge (28) of the plug nipple (19) which is nearer to the hose.

The insert (22) is made of a thermoplastic material.

A sleeve (31) with a ring (32) is rotatably affixed to the plug nipple (19). The sleeve (31) is provided at its front end (33) with recesses (34) for a bayonet fastener. The rear end (35) of the sleeve (31) is fitted with a gripping piece (36) which by its prolonged shank (37) extends partly over the gas hose (30), thus protecting the connecting point to the plug nipple (19), and which serves as an

operating device for the hose connection and at the same time, by the aid of the integrated indicator element (38), provides information on the control state of the connection.

Fig. 1 shows the connection in the uncoupled state. Fig. 2 shows this connection in the coupled state, the sleeve (31) having engaged, by means of its recesses (34) at the front end (33), the noses (17) of the gas socket, thus forming a bayonet fastener. The insert (22) by means of its coaxially positioned pin-type prolongation (23), has pressed back the sealing body (6) of the non-return valve, releasing the channel for the medium. In this control state the medium is enabled to flow through from the fixed piping network into the hose.

By the aid of the indicator element (38) on the gripping piece (36) and also of an indicator element (18) on the housing (4) of the gas socket the control state of the connection can be determined visually. The two indicator elements, when the two connection parts are completely coupled, must be situated directly opposite each other.

When the connection is in readiness for operation the coaxially positioned pin-type prolongation (23) of the insert piece (22) opens the sealing body (6) of the non-return valve. This at the same time bends the spring (7) of the non-return valve.

In the event of an outbreak of fire and the action of unusually high temperatures a softening occurs in the basic material of the insert (22). Under the pressure of the biasing force of the spring (7) the coaxially positioned pin-type prolongation (23) and/or the insert piece (22) is deformed until a degree of deformation is attained at which the spring power presses the sealing body (6)

of the non-return valve the whole way towards the valve seating (5). This action of the inserted plastic part protects the connection against overheating. This ensures that no medium can escape from the fixed part of the piping network. Even with an increase in the ambient temperatures and the possible loss of the sealing effect of the sealing element (11) the metallic sealing of the closure (6) of the non-return valve in relation to the valve seating (5) is maintained. This behaviour of the connection, by comparison with the connections so far known, which correspond to British Standard BS 669, Pt. 1, 1989, Sect. 3, ensures for the first time protection against thermal overloading.

In the completely coupled state there is no way of determining externally whether the connection has already been exposed to excess temperatures, to what degree of deformation the insert (22) and its coaxial pin-type prolongation (23) have suffered or whether or not the channel for the medium has been released. To improve the information, therefore, the gripping piece (36) is made of a material which even with comparatively low ambient temperatures than in the case of the insert (22) undergoes deformation and at the same time slides off the sleeve (31). This process, which only takes place in the event of excess temperature, is a reliable external sign that the connection has already been subjected to an excess temperature. This not only provides factual security when excess temperature takes effect but at the same time supplies information on any further temperature stresses which may already have been overcome. Despite these functions the complete connection, including the hose connected therewith still serves its purpose in the event of excess temperature, so that no medium can escape in an unverifiable manner.

Ex. 2:

In this example, illustrated in Fig. 3, an insert (22) is described which exerts the effect already described. An external ring (39) is provided on its surface (40) with a number of projections (41) which on eventual insertion into the plug nipple (19) provide a positive interlock with the groove (26) in the boring (21) of the latter. The insert (22) is made of a plastic which, above an ambient temperature of about 343° K, softens to such an extent that the spring (7) of the non-return valve is able to deform the insert (22) with its pressure. The coaxially positioned pin-type prolongation (23) is connected with the outer ring (39) by means of the webs (42) of the same material. By adapting the height (43) of the insert the latter can be dimensionally adapted to the prevailing installation conditions, also rendering it possible to adapt it to the pressure force of the spring (7) of the non-return valve. By the material properties of the plastic used, the dimensioning of the coaxial pin-type prolongation (23), of the webs (42) and of the height (43) and also by possible further changes in the cross section of the insert (22) the connection can be given optimum temperature characteristics.

Ex. 3:

In this example, shown in Fig. 4, a different constructional version of the insert part is described.

A concentrically positioned pin (46) is centred and secured, by means of three webs (47) evenly distributed over the periphery, in the boring (21) of the plug nipple (19). Three recesses (48) enable the medium to flow through to the hose unimpeded. With this version of the insert likewise the basic material

used is thermoplastic. In this version the basic characteristics of the thermal safety system can again be set by appropriate optimisation of material properties, dimensioning of the concentric pin (44) and the webs (47) and the selection of the over-all height (49).

CLAIMS

1. Connection for piping systems, particularly self-closing rapid coupling with a safety device, characterised in that a fixed piping system is sealed off at any desired terminal point by a coupling unit, preferably a gas socket, which is integrated into a releasable non-return valve, and a connecting piece is inserted into an outlet boring (2) and is sealed off in relation to the housing (4) of the gas socket by a sealing element (15) and is secured on at least one cam (17) by means of a bayonet ring (32) and by means of a pin-type prolongation (23) secures the sealing body (6) of the non-return valve in the open position, while the pin-type prolongation (23) is accommodated by an insert part (22) having at least one through-boring, the bayonet ring (32) being provided with a gripping and actuating surface and being axially supported on the connection piece by means of a securing element and at the same time rotatable, a thermal protection device being provided in the connection part.

2. Connection according to Claim 1, characterised in that the insert (22) and the pin-type prolongation (23) take the form of one single part of the same material.

3. Connection according to either one of Claims 1 and 2, characterised in that the pin-like prolongation (23) and/or the insert (22) are constructed of plastic and/or of metal alloys with a low melting point.

4. Connection according to Claim 3, characterised in that the pin-type prolongation (23) and/or the insert (22) are made of a deformable thermoplastic.

5. Connection according to either of Claims 3 and 4, characterised in that a material with a softening or melting temperature equal to or greater than 343° K is used for the pin-like prolongation (23) and/or the insert (22).

6. Connection according to any one of Claims 1-5, characterised in that the insert (22) is constructed with at least two apertures (45) and/or recesses (48) evenly distributed over its periphery.

7. Connection according to any one of Claims 1-5, characterised in that the insert (22) takes the form of a pin-type component with at least two legs of one and the same material which are shaped onto it and which serve to secure it in the boring (16) of the plug nipple.

8. Connection according to any one of Claims 1-7, characterised in that the bayonet ring (32) is fitted with a gripping piece (36) which by its shaft (37) covers the connection between the plug nipple (32) and the hose (30) or a pipe, the gripping piece (32) being made of a metallic material or of plastic or of thermoplastic.

9. Connection according to any one of Claims 1-8, characterised in that the housing (4) of the gas socket bears an indicator element (18) while the bayonet

ring (32) and/or the gripping piece (36) bears an indicator element (38) in such a way that the indicator elements (18) and (38) are situated opposite each other when the connection has been produced correctly and completely.

10. Connection in accordance with any one of Claims 1-9, characterised in that the housing (4) of the gas socket and/or the bayonet ring (32) and/or the gripping piece (36) bears signal devices which, when the connection is subjected to increased temperatures, set up an uninterrupted signal and/or in an at least partly perceptible manner cease to be capable of functioning.

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/DE 99/00245

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F16L37/38 F16L37/248

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 248 701 A (H. W. FOWLER) 8 July 1941 see claims 1-4; figures 1-5	1
A	US 2 459 477 A (J. VAN SCHUYVER) 18 January 1949 see claims 1,2; figures 1-5	1
A	US 3 334 860 A (C. G. BOLTON,JR) 8 August 1967 see figures 1-9	1,3
A	FR 1 405 726 A (SHELL) 31 May 1965 see figures 1-4	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 June 1999	07/07/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Angius, P

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

information on patent family members

Inte onal Application No
PCT/DE 99/00245

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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FR 1405726 A	17-11-1965	NONE	